

REMARKS

This amendment is filed in response to the final Office Action dated August 9, 2007. In view of these amendment and remarks, this application should be allowed and the case passed to issue. No new matter or considerations are introduced by this amendment. Claims 6 and 7 provide support for the amendment to claim 1. Support for the amendment to Table 2 is found in the specification at page 47, lines 19-21. The amendment to claim 18 is supported by claims 1, 6, and 7.

A 90 day suspension of prosecution is requested along with the accompanying Request for Continued Examination to allow for execution of a declaration under 37 C.F.R. § 1.132 showing unexpected results provided by the claimed stack-type automobile cell.

Claims 1-3, 6-12, 14-16, and 18 are pending in this application. Claims 1-3, 6-12, and 14-16 are rejected. Claim 18 is withdrawn pursuant to a restriction requirement. Claims 1, 6, 7, and 18 are amended in this response. Claims 4, 5, 13, and 17 were previously canceled.

Restriction

Upon the allowance of the stack-type automobile cell, Applicants respectfully request, rejoinder, examination, and allowance of claim 18, the method of manufacturing an automobile cell, in accordance with the provisions of MPEP § 821.04.

Claim Rejections Under 35 U.S.C. § 103

Claims 1-3, 6-12, and 14-16 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Shibuya et al. (U.S. Pat. No. 6,291,098) in view of Murai et al. (U.S. Pat. No. 6,444,355), Takami et al. (U.S. Pat. No. 6,544,682), and Yata et al. (U.S. Pat. No. 6,902,847). This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested.

The following is a comparison between the invention, as claimed, and the cited prior art.

An aspect of the invention, per claim 1, is a stack-type automobile cell comprising an electric power generating element, a positive electrode having a positive electrode active substance layer, a negative electrode having a negative electrode active substance layer, and a separator interposed between the positive electrode and the negative electrode. The positive electrode, the negative electrode and the separator are stacked in a stack direction to allow the positive electrode and the negative electrode, opposing to the positive electrode via the separator, to define a unit electrode. A cell outer sheath made from a laminate film compositely composed of polymer and metal is welded to gas-tightly encapsulate the electric power generating element inside the cell outer sheath such that the stack-type automobile cell is formed in a flat shape with a thickness defined by the cell outer sheath along the stack direction. A positive electrode terminal lead electrically conductive with the positive electrode is sandwiched between welded portions formed by the cell outer sheath that has been welded and extends to an outside of the cell outer sheath. A negative electrode terminal lead electrically conductive with the negative electrode is sandwiched between welded portions formed by the cell outer sheath that has been welded and extends to the outside of the cell outer sheath. A relationship between the thickness of the stack-type automobile cell and a sum of a thickness of the positive electrode active substance layer and a thickness of the negative electrode active substance layer, along the stack direction of the unit electrodes, is defined such that a value obtained by dividing the thickness of the stack-type automobile cell by the sum of the thickness of the positive electrode active substance layer and the thickness of the negative electrode active substance layer is equal to or greater than 10 and equal to or less than 80. The positive electrode active substance layer is formed on a positive electrode current collector and the negative electrode active substance layer

is formed on a negative electrode current collector such that a value obtained by dividing a thickness of the positive electrode terminal lead along the stack direction by a sum of a total thickness of the positive electrode current collector in the stack-type automobile cell is equal to or greater than 0.4 and equal to or less than 2.0. A value obtained by dividing a thickness of the negative electrode terminal lead along the stack direction by a sum of a total thickness of the negative electrode current collector in the stack-type automobile cell is equal to or greater than 0.4 and equal to or less than 2.0. A width of the positive electrode terminal lead is equal to or greater than 40 % of a length of one side of the cell outer sheath from which the positive electrode terminal lead extends to the outside, and a width of the negative electrode terminal lead is equal to or greater than 40 % of a length of one side of the cell outer sheath from which the negative electrode terminal lead extends to the outside.

The Examiner asserted that Shibuya et al. disclose a thin type cell comprising positive and negative electrodes and electrode thicknesses. The Examiner indicated that Shibuya et al. do not disclose the thickness of the positive electrode current collector, electrolyte, and separator. The Examiner alleged that dividing the thickness of the cell by the thicknesses of the positive and negative electrode active material layers yields a value no greater than ~4.

In view of Murai et al.'s teaching of 30 μm thick aluminum net, the Examiner maintained that it would have been obvious to use aluminum net with a thickness of 30 μm because it's commonly known to use an aluminum current collector with this dimension to conduct current in a wound battery.

The Examiner averred that Takami et al. disclose that the positive electrode layer and the negative electrode layer each has a thickness between 10 μm and 150 μm and that is possible to improve large discharge characteristics and cycle life. The Examiner contended that it would

have been obvious to make the battery of Shibuya et al. and Murai et al. with electrode layer thicknesses between 10 μm and 150 μm for the benefit of improving cycle life and that doing so would yield a ratio of thickness of the cell by the thickness of the active substances as high as 36.4.

The Examiner alleged that it would have been obvious to stack several unit cells together to as taught by Yata et al. to increase cell capacity.

Shibuya et al., Murai et al., Takami et al., and Yata et al. whether taken alone, or in combination, do not suggest the claimed stack-type automobile cell. Takami et al. and Murai et al. are directed to wound cells, while Shibuya et al., Yata et al., and the present invention are directed to a stack-type cell. It would not have been obvious to combine the teachings of Murai et al. and Takami et al., directed to wound cells, with the teachings of Shibuya et al. and Yata et al., which are directed to stack-type cells. One of ordinary skill in this art attempting to solve a problem in a stack-type cell would not look towards the wound cell teaching of Murai et al. and Takami et al.

The configuration and structure of wound cells and stack-type cells are very different. Each type of cell has its own problems and concerns. Wound cells typically comprise one each of an anode and cathode. The electrodes are long and relatively thin to facilitate winding. The wound structure typically has a single anode tab and cathode tab extending from the wound structure. While in a stack-type cell there can be multiple anode and cathode plates and separator sheets and there are multiple tabs extending from the multiple electrodes. Relatively thicker electrodes can be used in a stack cell than a wound cell. Proper registration of the electrodes have to be maintained during winding or stacking. The means for ensuring proper electrode registration are different for stack-type and wound cells. Thus, the fabrication

techniques are quite different for wound cells than stack-type cells. The multiple plates in stack-type cell can make electrode registration more challenging than in a wound cell. Also the multiple tabs in a stack-type cell can create more possible short circuit paths. In a wound cell electrode dimension tolerances may be of greater concern than in a stack-type cell.

Further, the combination of Shibuya et al., Murai et al., Takami et al., and Yata et al. do not suggest a stack-type automobile cell comprising positive and negative electrodes wherein a relationship between the thickness of the automobile cell and a sum of a thickness of the positive electrode active substance layer and a thickness of the negative electrode active substance layer, along the stack direction of the unit electrodes, is defined such that a value obtained by dividing the thickness of the stack-type automobile cell by the sum of the thickness of the positive electrode active substance layer and the thickness of the negative electrode active substance layer is equal to or greater than 10 and equal to or less than 80, the positive electrode active substance layer is formed on a positive electrode current collector and the negative electrode active substance layer is formed on a negative electrode current collector such that a value obtained by dividing a thickness of the positive electrode terminal lead along the stack direction by a sum of a total thickness of the positive electrode current collector in the stack-type automobile cell is equal to or greater than 0.4 and equal to or less than 2.0, a value obtained by dividing a thickness of the negative electrode terminal lead along the stack direction by a sum of a total thickness of the negative electrode current collector in the stack-type automobile cell is equal to or greater than 0.4 and equal to or less than 2.0, a width of the positive electrode terminal lead is equal to or greater than 40 % of a length of one side of the cell outer sheath from which the positive electrode terminal lead extends to the outside, and a width of the negative electrode terminal lead

is equal to or greater than 40 % of a length of one side of the cell outer sheath from which the negative electrode terminal lead extends to the outside, as required by claim 1.

The cited combination of references do not suggest the unexpected improvement electrode terminal lead temperature. As shown in Table 2 and Exhibit 1 of the Declaration Under 37 C.F.R. § 1.132 by a present inventor, at electrode terminal lead width/cell width ($L5, L5'/L6, L6' \times 100 \%$) less than 40 % there is a sharp and unexpected increase in the temperature of the electrode terminal lead. Thus, the automobile cells according to the present invention provide an unexpected improvement in safety not suggested by the cited references.

Obviousness can be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge readily available to one of ordinary skill in the art. *In re Kotzab*, 217 F.3d 1365, 1370 55 USPQ2d 1313, 1317 (Fed. Cir. 2000); *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). There is no suggestion in Shibuya et al., Murai et al., Takami et al., and Yata et al. to modify the thickness of the stack-type automobile cell and a sum of a thickness of the positive electrode active substance layer and a thickness of the negative electrode active substance layer, along the stack direction of the unit electrodes, such that a value obtained by dividing the thickness of the stack-type automobile cell by the sum of the thickness of the positive electrode active substance layer and the thickness of the negative electrode active substance layer is equal to or greater than 10 and equal to or less than 80, the positive electrode active substance layer is formed on a positive electrode current collector and the negative electrode active substance layer is formed on a negative electrode current collector such that a value obtained by dividing a thickness of the positive electrode terminal lead along

the stack direction by a sum of a total thickness of the positive electrode current collector in the stack-type automobile cell is equal to or greater than 0.4 and equal to or less than 2.0, and a value obtained by dividing a thickness of the negative electrode terminal lead along the stack direction by a sum of a total thickness of the negative electrode current collector in the stack-type automobile cell is equal to or greater than 0.4 and equal to or less than 2.0, a width of the positive electrode terminal lead is equal to or greater than 40 % of a length of one side of the cell outer sheath from which the positive electrode terminal lead extends to the outside, and a width of the negative electrode terminal lead is equal to or greater than 40 % of a length of one side of the cell outer sheath from which the negative electrode terminal lead extends to the outside, as required by claim 1. Therefore claim 1 is not obvious in view of Shibuya et al., Murai et al., Takami et al., Yata et al.

The mere fact that references can be combined or modified does not render the resulting combination obvious unless the prior art also suggests the desirability of the modification. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). It is submitted that Murai et al, Takami et al., and Yata et al. do not suggest the desirability of the claimed arrangement of the automobile cell of the present invention. Even if it were possible to combine the four cited references in such a manner by picking and choosing specific teachings from the cited references to achieve the present invention, it is submitted that the process of picking and choosing would result from an impermissible hindsight reconstruction of the claimed invention. There is no suggestion in the combined references to produce an automobile cell with the specifically claimed structure.

The only teaching of the claimed stack-type automobile cell comprising positive and negative electrodes wherein a relationship between the thickness of the stack-type automobile cell and a sum of a thickness of the positive electrode active substance layer and a thickness of

the negative electrode active substance layer, along the stack direction of the unit electrodes, is defined such that a value obtained by dividing the thickness of the stack-type automobile cell by the sum of the thickness of the positive electrode active substance layer and the thickness of the negative electrode active substance layer is equal to or greater than 10 and equal to or less than 80, the positive electrode active substance layer is formed on a positive electrode current collector and the negative electrode active substance layer is formed on a negative electrode current collector such that a value obtained by dividing a thickness of the positive electrode terminal lead along the stack direction by a sum of a total thickness of the positive electrode current collector in the stack-type automobile cell is equal to or greater than 0.4 and equal to or less than 2.0, and a value obtained by dividing a thickness of the negative electrode terminal lead along the stack direction by a sum of a total thickness of the negative electrode current collector in the stack-type automobile cell is equal to or greater than 0.4 and equal to or less than 2.0, a width of the positive electrode terminal lead is equal to or greater than 40 % of a length of one side of the cell outer sheath from which the positive electrode terminal lead extends to the outside, and a width of the negative electrode terminal lead is equal to or greater than 40 % of a length of one side of the cell outer sheath from which the negative electrode terminal lead extends to the outside, is found in Applicants' disclosure. However, the teaching or suggestion to make a claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

The dependent claims are allowable for at least the same reasons as claim 1 and further distinguish the claimed stack-type automobile cell.

In view of the above amendments and remarks, Applicants submit that this case should be allowed and passed to issue. If there are any questions regarding this Amendment or the application in general, a telephone call to the undersigned would be appreciated to expedite the prosecution of the application.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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